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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,143	09/20/2005	Kazunori Inogai	L9289.05148	1484

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EXAMINER	
WENDELL, ANDREW	
ART UNIT	**PAPER NUMBER**
2618	

DATE MAILED: 12/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/538,143	INOGAI ET AL.	
	Examiner	Art Unit	
	Andrew Wendell	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on 20 September 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar et al. (US Pat# 6,680,969) in view of Walton et al. (US Pat Pub# 2006/0105761).

Regarding claim 1, Molnar teaches a channel simulation method to simulate transmission comprising a channel variation forming step of forming a channel variation on a channel using information of arrangements of transmission and reception antenna (Figs. 3 and 4); and a channel variation adding step of adding channel variations corresponding to the channel to respective signals of the channel (Fig. 5; Col. 6 lines 7-52). Molnar fails to teach M.times.N channels formed by M transmission antennas and N reception antennas.

Walton teaches M.times.N channels formed by M transmission antennas and N reception antennas (Figs. 5, 7, and 8B).

Therefore it would have been obvious at the time the invention was made to incorporate M.times.N channels formed by M transmission antennas and N reception antennas as taught by Walton into Molnar's channel estimator in order to improve system performance (Section 0009).

Regarding claim 2, the combination including Molnar teaches wherein in the channel variation forming step, a delay and a phase variation on each of the channels due to the arrangements of antennas are obtained using the information of arrangements of transmission and reception antennas, and channel variations are formed such that the delay and the phase variation vary with the channels (Fig. 5; Col. 6 lines 7-52).

Regarding claim 3, the combination including Molnar teaches wherein in the channel variation forming step, in forming a short-term variation on each of the channels as the channel variation, short-term variations corresponding to the channel are formed by obtaining a difference in path distance between each path of a reference channel beforehand set or prepared and pertinent each path of each of the channels using the information of a positional relationship between transmission and reception antenna on each of the channel and information of a radiation direction and a direction of arrival on each path, and for a signal of pertinent each path of each channel, generating a short-term variation such that a phase difference occurs with respect to a short-term variation of each path of the reference channel by the difference in path distance (Fig. 5; Col. 6 lines 7-52).

Regarding claim 4, the combination including Molnar teaches wherein in the channel variation forming step, in forming an instantaneous variation on each of the channels as the channel variation, correlated instantaneous variations corresponding to the channel are formed by repeating processing, the number of times corresponding to the channel, for generating respective band-limited gaussian noises corresponding

to the reference channel and another channel, subjecting two band-limited gaussian noises to weighted addition with correlated filter characteristics using at least the information of arrangements of antennas as a parameter, and thereby forming a correlated instantaneous variation correlated with an instantaneous variation on the reference channel (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 5, the combination including Molnar teaches wherein the channel variation forming step includes the steps of: generating instantaneous variations mutually independent between the channels; obtaining an correlation matrix from a difference in propagation path distance of each path obtained from input data or experiment data and a positional relationship of antennas, and theoretical spatio correlation values of Rayleigh fading; obtaining based on the correlation matrix a transformation matrix to calculate mutually correlated signal vectors from signal vectors that are not correlated with one another; and obtaining correlated instantaneous variations correlated between channels, by repeating, the number of times corresponding to the number of paths, matrix operation processing using the transformation matrix for each instantaneous variation of a pertinent path of each channel (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 6, the combination including Molnar teaches wherein the channel variation forming step includes the steps of: generating instantaneous variations mutually independent between channels and between paths; obtaining an correlation matrix from a difference in propagation path distance of each path obtained from input data or experiment data and a positional relationship of antennas, and

theoretical temporal-spatio correlation values of Rayleigh fading; obtaining based on the correlation matrix a transformation matrix to calculate mutually correlated signal vectors from signal vectors that are not correlated with one another; and obtaining correlated instantaneous variations correlated between paths, by performing matrix operation processing using the transformation matrix on the instantaneous variation (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 7, the combination including Molnar teaches wherein in the step of obtaining a transformation matrix, the transformation matrix is obtained by eigenvalue transformation (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 8, the combination including Molnar teaches wherein in the step of obtaining a transformation matrix, the transformation matrix is obtained by Cholesky factorization (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 9, Molnar teaches a channel simulator that that simulates channel characteristics of a wireless apparatus using an channel transmission system comprising an input section "channel estimates" (Fig. 5) which inputs M signals obtained by a transmission system of the wireless apparatus (Fig. 5, Col. 6 lines 7-52); a signal replicating section which makes N copies of each of the M signals, and thereby forms channel signals (Fig. 5, Col. 6 lines 7-52); a channel processor that adds a channel variation to each of the channel signals corresponding to arrangements of transmission and reception antennas (Fig. 5, Col. 6 lines 7-52); and a combiner 57 (Fig. 5) that selectively combines M channel signals repeatedly among the channel signals each provided with the channel variation to form N signals (Fig. 5, Col. 6 lines

7-52). Molnar fails to teach M.times.N channels formed by M transmission antennas and N reception antennas.

Walton teaches M.times.N channels formed by M transmission antennas and N reception antennas (Figs. 5, 7, and 8B).

Regarding claim 10, the combination including Molnar teaches wherein the channel processor has a path former that forms a signal of each path having a delay corresponding to the arrangements of transmission and reception antennas for a signal of each of the channels, a short-term complex impulse response generator that forms a complex gain of a short-term variation to be added to each path of each of the channels, and a short-term variation adder that adds the short-term variation to the signal of each path of the each of the channels, and the short-term complex impulse response generator obtains a difference in path distance between each path of a reference channel and pertinent each path of each of the channels using information of a positional relationship between transmission and reception antennas on each of the channels and a radiation direction and a direction of arrival on each path, and for the signal of each path of each of the channels generated in the path former, generates a short-term variation such that a phase difference occurs with respect to a short-term variation of each path of the reference channel beforehand set or prepared by the difference in path distance (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 11, the combination including Molnar teaches wherein the channel processor has a path former that forms a signal of each path having a delay corresponding to the arrangements of transmission and reception antennas for a signal

of each of the channels, a correlated gaussian noise generator that generates a correlated instantaneous variation to be added to each path of each of the channels, and a correlated instantaneous variation adder that adds the correlated instantaneous variation to the signal of each path of each of the channels (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 12, the combination including Molnar teaches wherein the correlated gaussian noise generator forms correlated instantaneous variations corresponding to the channels by repeating processing, the number of times corresponding to the channels, for generating respective band-limited gaussian noises corresponding to the reference channel and another channel, subjecting two band-limited gaussian noises to weighted addition with correlated filter characteristics using at least the information of arrangements of antennas as a parameter, and thereby forming a correlated instantaneous variation correlated with an instantaneous variation on the reference channel (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 13, the combination including Molnar teaches a transformation matrix calculator which obtains a correlation matrix from a difference in propagation path distance of each path obtained from input data or experiment data and a positional relationship of antennas, and theoretical spatio correlation values of Rayleigh fading, and then, based on the correlation matrix, obtains a transformation matrix to calculate mutually correlated signal vectors from signal vectors that are not correlated with one another, wherein the correlated gaussian noise generator has: an instantaneous variation generator that generates instantaneous variations mutually

independent between channels; and a matrix operator that generates correlated instantaneous variations correlated between channels, by repeating matrix operation processing using the transformation matrix on the instantaneous variations the number of times corresponding to the number of paths (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 14, the combination including Molnar teaches a transformation matrix calculator which obtains a correlation matrix from a difference in propagation path distance of each path obtained from input data or experiment data and a positional relationship of antennas, and theoretical temporal-spatio correlation values of Rayleigh fading, and then, based on the correlation matrix, obtains a transformation matrix to calculate mutually correlated signal vectors from signal vectors that are not correlated with one another, wherein the correlated gaussian noise generator has: an instantaneous variation generator that generates instantaneous variations mutually independent between the channels and between the paths; and a matrix operator that generates correlated instantaneous variations correlated between the paths, by performing matrix operation processing using the transformation matrix on the instantaneous variations (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 15, the combination including Molnar teaches wherein the transformation matrix calculator obtains a transformation matrix by eigenvalue transformation (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 16, the combination including Molnar teaches wherein the transformation matrix calculator obtains a transformation matrix by Cholesky factorization (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 17, the combination including Molnar teaches an analog adjustor which is comprised of a digital circuit, and simulates fluctuations in a signal of each of the channels caused by fluctuations in performance of an analog circuit corresponding to each of the channels (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 18, the combination including Molnar teaches an input interface that inputs an output signal of a digital baseband processor of a transmission system of the wireless apparatus; a gain controller that performs gain control such that a signal level becomes almost constant of a multipath signal resulting from addition of the signal of each path provided with the channel variation; and an output interface that outputs the digital baseband signal subjected to the gain control to a digital baseband processor of the reception system of the wireless apparatus, wherein the channel processor adds a channel variation component with an I component and a Q component equal to each other (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 19, the combination including Molnar teaches wherein in the step of obtaining a transformation matrix, the transformation matrix is obtained by eigenvalue transformation (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 20, the combination including Molnar teaches wherein in the step of obtaining a transformation matrix, the transformation matrix is obtained by Cholesky factorization (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 21, the combination including Molnar teaches wherein the transformation matrix calculator obtains a transformation matrix by eigenvalue transformation (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Regarding claim 22, the combination including Molnar teaches wherein the transformation matrix calculator obtains a transformation matrix by Cholesky factorization (Fig. 5; Col. 6 lines 7-Col. 9 line 11).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Wendell whose telephone number is 571-272-0557. The examiner can normally be reached on 7:30-5 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nay Maung can be reached on 571-272-7882. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrew Wendell
Andrew Wendell
Examiner
Art Unit 2618

Quochien B. Vuong 11/13/06

11/08/2006

QUOCHIEN B. VUONG
PRIMARY EXAMINER